

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Improvements relating to Drilling Machines.

I, ERNEST REICH, of Vorosmarty u. 16, Budapest VI, Hungary, a Hungarian citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in drilling machines, and particularly to the arrangement of parts thereof, which cooperate to render the machine of extremely compact construction and convenient to operate, having no overhead structure to interfere with the locating of work thereon or its removal.

The common construction in drilling machines includes a table upon which the work is placed and overhead mechanism adapted to drive the drill spindle. In such a type of machine it is to be observed that the work occupies a position between the drill and the table. The present invention differs therefrom in that the table is positioned between the work and the drill spindle, which arrangement results in substantial and very practical advantages.

Heretofore various small portable tools have been constructed with a bracket or similar structure lying between the work and the drill spindles, but such arrangements were not constructed in a manner to meet the objects of this invention, nor are they capable of accomplishing the results to be noted herein.

Other objects of this invention which contribute to the general practical arrangement include convenient and quickly operated means for securing the work on the table, which means include certain types of drill fixtures and clamping means therefor, which are especially designed to cooperate with the arrangement of table and drill spindle and operating mechanism therefor noted above.

Still other objects relate to means for maintaining the table and drill bushing and related structure free from chips often causing misalignment of the work and friction within the tool guiding means and overheating of the working tool. The arrangement is such that only one guide bushing is needed.

The above objects are accomplished by the arrangement of the elements to be described and are especially effective to accomplish the desired results in the herein disclosed vertical arrangement of the tools and by the application in one of the forms of a centrifugal fan or other means attached to the rotary spindle for removing the chips from the operating parts.

To enable others skilled in the art to fully apprehend the underlying features hereof so that they may embody the same in the various ways contemplated by this invention, the invention will now be described with reference to the accompanying drawings, wherein:—

Figure 1 is a general view showing a novel arrangement of the elements of a drilling machine embodying the present invention. Fig. 2 is a top plan view thereof. Fig. 3 is a modification of the structure shown in Fig. 1; Fig. 4 is a sectional view through the work-holding jig on the line 4—4 of Fig. 1; and Fig. 5 is a top plan view thereof.

The structure illustrated in Figs. 1 and 2, includes a base 1, having integral therewith the upright supporting frame portion 2 adapted to carry thereon the electric motor 3, movable in guideways 4 and adapted to be moved therein by means of the lever 5 pivoted to the frame at 6, and having a fork at the inner end provided with slots 7 therein, and receiving pins 8 secured to the motor. The lever 5 may be operated in any desired manner, but as shown is most conveniently operated by foot. It is evident as illustrated in Fig. 3 e.g. that other types of prime movers may be employed without departing from important features of this invention.

Supported at the upper end of the frame is the table 9, having a spider 10 secured therewithin, which spider is adapted to support the drill bushing 11. With the arrangement illustrated it is obvious that only one guide bushing is required whereas differently arranged machines and jigs require a number thereof. The motor as shown is directly connected to the drill 12 adapted to

operate through the opening 13 of the work-table.

As shown in Figs. 1 and 2 the work 15 may be conveniently placed on the flat 5 upper surface of the work-table 9, in which position the work is secured by means of the jig or holder 16 adapted to fit over the work and being movable on the table, but adapted to be located in the 10 desired exact position by means including a lever 17 pivoted at 18 to a bracket or stud 19 secured to the table. The lever 17 is provided with a locating pin 20 adapted to be selectively inserted into one 15 of the recesses 21 of the work holder 16. If desired the lever 17 may be held in place by hand or by means of a stud 22 secured to the table and having a hand operated excentric 23 at the upper end 20 thereof adapted to engage the lever 17 and lock the locating pin 20 in the selected recess 21.

Other means may obviously be resorted to for clamping the lever down, such as 25 e.g. a hand nut screwed on the upper end of stud 22. Also the height either of the studs 19 or 22 may be changed as by means of a washer 25 shown on stud 22.

As may be seen the work-table presents 30 a flat upper surface which may be of any desired height, and upon which the work may be placed without any interference from overhead structure, the drill and operating mechanism being all located 35 below the table and on the opposite side thereof with respect to the work piece. The table presents a broad upper surface which may be of any desired extent and adapted to support and have arranged 40 thereon work pieces of any dimensions or shape.

The work support shown is illustrative only. An important feature of this invention lies in the fact that one large continuous table or platform 9 may be provided having any desired number of 45 machines placed in suitable relation thereto and enabling the work to be readily passed from one machine to another.

The drill may be made of any desired capacity from a very small to the largest and likewise, if desired, the drill may be 55 arranged horizontally, but for ordinary work is most advantageously used in the vertical position shown. If the machine is to be of large capacity, it may be imbedded within the floor, the only 60 exposed portions being a suitable means for driving the spindle and the work-table with its work securing means. It is obvious in any event that the compactness and arrangement of the elements is capable of extreme economy of space 65 occupied.

A drill jig embodying an idea which renders it peculiarly adapted for the above described drill is illustrated in detail in Figs. 4 and 5. 26 indicates the holes to be drilled in the work-piece 15 embedded 70 in the face of the holder 16. 21 are the corresponding recesses in the upper surface of the fixture adapted to receive the locating pin 20. Communicating grooves 27 connect the various recesses. With a 75 slight retraction of the pin 20 so that it occupies a position in the groove only the holder may be quickly moved from one position to another in a path determined by the groove, thereby increasing to a 80 large extent the speed with which the complete operation may be performed. If desired flared entrances or exits 28 and/or 29 may be provided.

An important feature of this invention 85 resides in the arrangement and structure for maintaining the work-holder and the frictionally engaging surfaces free of chips. In the illustration shown in Fig. 1 the chips normally fall down and are 90 received by a pan 30, from which they are conveniently removed. The maintenance of the parts free from metal chips and foreign material is aided and made more positive by means of a centrifugal fan 31 95 secured to rotate with the drill spindle. A suction is thereby continually maintained on the work-bearing surfaces and on the operating parts and the entire exposed structure is thereby kept free of 100 chips and simultaneously cooled which is a great advantage over drills, for example, which are mounted above the work piece and the supporting table and in which type the chips must necessarily fall on the 105 table and be distributed over the exposed surfaces in an undesirable fashion. The drill shown is a high speed drill. If a low speed drill is desired the speed of the various parts may be suitably arrived at 110 by the provision of proper gearing.

As an aid in removing the chips from the region of the drill bushing 11 it is to be noted that the upper surface 38 115 thereof is in the shape of a truncated cone and is spaced from the work support so as to prevent metal chips from being drawn into the bushing. If desired, a cooling medium or lubricant may be supplied to discharge in a spray about the 120 drill through the pipe 39. A modification of the structure is shown in Fig. 3 wherein the prime mover consists of a pulley 32 mounted to drive the drill 33 secured in the central shaft 34, which shaft is splined 125 at 34<sup>a</sup> in the sleeve 35, and which sleeve, in turn, is rotated with pulley 32. A suitable flexible drive belt or cable 36 is provided for rotating the shaft from a convenient source of power. In this con- 130

struction the sleeve 35 has secured thereto the deflector 37 adapted to rotate therewith and discharge the work chips from the region of the operating parts to any suitable collecting receptacle.

5 Drilling machines adapted to work heavy workpieces can be arranged below the floor, e.g. in the underground floor, the work-table in such case being in alignment with the floor. The advantages of such arrangement are self explanatory.

10 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A drilling machine for drilling metal work pieces by the use of a template, in which machine the drill does not operate upon the work-piece from the top downwards, characterised in that a guide sleeve for the drill and the work-piece and its holder or template are arranged on opposite sides of a work table.

2. A drilling machine according to claim 1, in which the guide sleeve for the drill is mounted in a spider or the like provided with holes therein and secured to the work-table.

3. Drilling machine according to claims 1—2 characterised in that the guide means for the drill is spaced from the work supporting surface and is arranged beneath the same.

4. Drilling machine according to claims 1—3, characterised in a bracket secured to the work-table and a drill bushing guide means carried thereby, spaced from

the work-table to permit the ready passage of removed material therethrough.

5. Drilling machine according to claims 1—4 characterised in that the bushing guide means slopes outwardly away from the work-piece to permit the free passage of the removed material away from the drill point.

6. Drilling machine according to claims 1—5, characterised in that the tool spindle and the operating means therefor are arranged on one side and the means for securing work to the work-table are arranged on the opposite side thereof.

7. In a drilling machine according to claims 1—6 the arrangement of a fan mounted adjacent the supporting means and tool to maintain them free of the removed chips and all foreign material.

8. Drilling machine according to any of the preceding claims, characterised in that the machine is arranged below the floor e.g., in the underground floor, the work-table being in alignment with the floor.

9. A drilling machine for drilling metal work pieces by the use of a templet, in which machine the drill does not operate upon the work piece from the top downwards, constructed, arranged and adapted to operate as a whole substantially as described in connection with the accompanying drawings.

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[This Drawing is a reproduction of the Original on a reduced scale.]

